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ABSTRACT

The fluid power industry has been a leader in technical education. The problem of preparing skilled manpower is both short-term as regards current needs and long-term in light of the general objectives of American education. Career education provides the solution. The opportunity is available to leaders of the fluid power industry to support both long-range career education and occupational and adult programs on a State and local level. (MS)

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THE ROLE OF THE NATIONAL FLUID POWER ASSOCIATION IN TECHNICAL EDUCATION*

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*Keynote Address at the National Fluid Power Association Meeting, Milwaukee, Wisconsin, November 13, 1972.

It is a special pleasure for me to be a part of this meeting today for many reasons. One of the most compelling is that I believe the Fluid Power Industry has and continues to exhibit exemplary leadership in its particular field. Through your Fluid Power Foundation, under the strong and imaginative leadership of Ted Pearce and others, you have organized your industry with commendable foresight, setting aside personal and financial resources to undertake special projects and programs in the interest of both your industry and that of the public.

It is with pride that I note that Governor Patrick Lucey of Wisconsin is with us today as we honor those who have contributed to the Fluid Power Curriculum Guide Project. Since this has been declared "Fluid Power Week" in Wisconsin by Governor Lucey, I would like to recall some his historical facts about your organization.

I am particularly glad that I could be a part of the early organizational thrust which evolved into the Fluid Power Association and the Fluid Power Foundation. The experience of being associated at the beginning with Mr. George Carlson and a number of your other early pioneers whose imagination and support initially brought the industry's interests together by forming the International Council for Fluid Power Education was a privilege and inspiration. We the Council for Fluid Power Education in 1962 with representatives from the Fluid Power Society, National Association of Industrial and Teacher Educators, National Fluid Power Association, American Society for Engineering Education, American Technical Education Association, and the Industrial Division of the AVA to make it possible for representatives of industry and education to further instruction related to the use of hydraulics and pneumatics in transmitting, utilizing, and controlling power.

It is not surprising then, but we believe particularly significant, that your inquiries and analyses of how best to serve your industry and the interests of the national industrial establishment has led you to make a substantial

educational effort.

We in the Office of Education are glad to have been junior partners in one of your more recent major education efforts; that of preparing a two-year post-secondary curriculum guide for the preparation of fluid power technicians, those critically needed technical supportive personnel who assist engineers and managers of modern industry, in the design, manufacture, installation, servicing, operation and adaption of fluid power energy conversion devices. You have recognized better than most how essential the highly skilled technician is in supporting the efforts of your engineers and how important it is to prepare beginning employees with a solid technical background so they can find rewarding challenges in administration, quality control, management, sales, servicing and individual enterpreneurship in your industry. I repeat we are glad to have had a small part in this significant effort.

Although recognizing the awareness which you have already demonstrated of the need for action by an organization such as yours to accelerate, improve and strengthen the educational preparation of skilled technicians for our modern technological society, I should like to discuss the problem of preparing skilled manpower as the U.S. Office of Education sees it.

It is becoming increasingly clear that the largest increase in job opportunities in the nation's work force is now and will continue to be for persons below the baccalaureate level with specialized skills and knowledge. The final specialized schooling and work experience required to prepare such specialized personnel must be based on high school preparation, but most of it is gained beyond high school at the present time.

We as a Nation are confronted with a problem of preparing more of our working population to cope with increasingly technical and demanding

jobs each year. This problem will become more critical rather than less because the increasing rate of technological development will not be reversed; fewer and fewer unskilled and untrained people will be able to meet the requirements for employment today and in the years to come. There are two important considerations for the solution of this educational problem:

(1) The short-range problem of meeting current and near term future needs.

(2) The long-range approach which will better prepare future generations for the demanding tasks by which they must earn their living and take their places as productive citizens in this Nation.

FILLING SHORT-RANGE OCCUPATIONAL MANPOWER NEEDS

How can we increase the supply of urgently needed technically prepared supportive personnel for industries such as yours? The stern and realistic facts of life demand that we start with our present manpower resources. Every year thousands of our youth graduate with varying degrees of preparation from high schools and must have further educational preparation before they can fulfill the tasks which most employers seek to fill. Graduates of two-year junior and community colleges and even four-year colleges with liberal arts degrees and little useful industrial employment preparation also comprise a part of the potential manpower to be trained. Returning veterans and persons who have recently graduated from or left high school and been employed part-time or full-time on unskilled jobs further swell the ranks of the potential population which can aspire to fill technical or supportive career occupations. Finally, there is a large reservoir of persons

already employed who have demonstrated their willingness to work and their quality as employees, but who are working at tasks far below their potential. They represent another very important part of the potential specialized supportive work force.

There is already a large establishment which can serve the needs of most of these individuals. Programs beyond the high school in private or public junior and community colleges, proprietary schools, four-year colleges, technical institutes, and some area vocational-technical schools provide post-secondary programs for employed adults and for other students who are available for full-time instruction.

It is in this establishment that the excellent curriculum guide prepared by your organization, Fluid Power Technology, A Suggested Two-Year Post High School Curriculum can be useful for preparing fluid power technicians. It is also in this establishment that the mechanical design, instrumentation, electronic, data processing, allied health and numerous other technicians, and specialists; and highly trained office and warehouse workers, secretaries, personnel specialists and a host of other persons can be prepared. The establishment it already there and being supported by Federal, State and local tax dollars.

UPGRADING SKILLED OR SEMI-SKILLED EMPLOYEES IN POST-HIGH SCHOOL PROGRAMS

The thousands of employed persons in industrial and even governmental agencies present special problems and challenges, and a

special potential value in the solution of the problem of preparing more and better occupational career specialist for today's and tomorrow's needs.

When a fluid power or other needed technician educating program is established in a community college, technical institute, area technical school or division of a 4-year college, and only when the program is established, is there an optimum environment for approaching the important task of providing supplementary organized study to upgrade already employed related semi-skilled mechanics or skilled workers to the technical level.

When a community college or a technical college has an adequate department head and skilled teachers of technical specialities, and of mathematics and physics and chemistry as they apply to the technology, the ground work is all done and the environment is ideal for bringing the specialized scientific education and the related mathematics to ambitious and highly motivated mechanics and skilled workers who are already on employers' payrolls.

If a sufficient number of persons are available in one employer's plant, the teachers can be brought to the plant. Usually, however, it is better if the employees can be taken to classes on campus with laboratories and a formal school environment, taught by knowledgeable persons who understand adult educational psychology and who also are knowledgeable about the technical specialization of the field. These appear to be elements of a situation in which motivated full-time employees can be taught the parts of their technical background which they lack.

The motivation of older employees often seems to be an area of some difficulty for employers. Systems of providing weekly or even daily released time with pay for selected employees has been very successful. Employees who are willing to study and who exhibit the characteristics of ambition and capability to aspire to the technician or similar occupational specialist level are given short, intensive courses in technical programs planned particularly for them by the employers and school staffs. This has the educational advantage of permitting the employees who are working most of the time on the job to apply the newly learned information daily.

To start such programs in an established institution with an ongoing fluid power technology program requires planning, and above all, support by the employer. To inform candidates who are already employed that the programs are available and approved by the management is usually not enough to stimulate them sufficiently to undertake the study. It may not even be enought to suggest to them that if they study the company will pay the cost of successfully completed schooling. Employed workers with 10 or 15 years of experience often are so busy with family responsibilities, other off-the-job duties and activities, and recreational interests that they find it very difficult to arrange formal study.

The British "block time release" (or sandwich) programs of formal study supplementing daily work seem to succeed because the selected employees go to school to programs planned by their employers and the school staff, and because the employees are

paid when at school at the same rate as if they were at work.

To make such a program succeed involves difficult policy decisions, cost decisions, inter and intra-organizational adjustments and arrangements on the part of the employer. However, it may be that the seriousness of the need for better qualified technical and supportive workers in the field of fluid power and a number of other fields should cause the necessary adjustments and expenditures to be made.

THE NEED FOR A LONG RANGE PROGRAM TO IMPROVE AMERICAN EDUCATION

Evidence abounds which clearly indicates the need for long-range improvements in the education of our people from early school days and throughout their working lives. In an address by the Vice President of the United States delivered to the American Association of School Administrators' Convention at Atlantic City, New Jersey on February 16, 1972, Mr. Agnew summed up the need as follows:

> "(But) there is one particular aspect of education that has caused a growing concern among many educators and among members of the Administration as well. I would like to devote the remainder of my remarks today to this specific problem and to what I regard as a bold and exciting program aimed at solving it.
>
> "What has disturbed me, as it has disturbed many of you, is that, while our present system of education does teach our young people to think, even to care, it is not adequately preparing the majority of them to earn a living commensurate with their desires, their interests, their talents or the

Nation's needs.

"Part of the problem is that many of our youngsters become school dropouts. Last year, about 1.7 million young people left schools and colleges before getting their diplomas. Another 750,000 were graduated from high school with general curriculum credits. All 2,450,000 became eligible to enter the labor market with few if any marketable skills.

"What did we spend to educate these 2.5 million young people for potential failure?

"..850,000 dropped out of elementary or secondary school. Assume that, on the average, they left at the end of the 10th grade. At $8,000 per child for schooling that began in kindergarten or first grade, these dropouts represented an outlay of $7 billion.

"..750,000 graduated from the high school general curriculum that has traditionally been the dumping ground for students who do not elect vocational training or plan to go to college. At $12,000 per student, total cost to the Nation ran about $9 billion.

"..850,000 entered college but left without a degree or completion of an occupational program. Assume that, on the average, they left at the end of the first year. These young people added $12 billion to costs.

"If you have been adding with me, you know that in sum we are talking about an expenditure of some $28 billion. That is one-third of the entire $85 billion cost of education last year. And these young people and expenditures reflect the dropout rate of a single year. If you try to include the millions of dropouts and billions of dollars spent in years past, the losses become astronomical.

"What we can never measure are the personal losses of these young people -- their frustrations, their shattered hopes and dreams. Nor can we calculate the contributions they might have made to our national vitality and progress.

"Surely, we should, we must ask more of education.

"Surely, a Nation that has the competence to place man on the moon, and conquer one disease after another, can design a better system to prepare its youth for adulthood.

"Surely, we can acquaint our children early enough with the myriad career choices available in this diverse economy of ours and surely, we can prepare them to occupy a satisfying place in it.

"Surely, we can if we will -- if we have the vision and the courage to explore new areas, to embrace a brand new concept in education.

"President Nixon calls the new concept Career Education, and he has made it one of his high priorities."

A new Department of Labor study, U.S. Manpower in the 1970s not only looks ahead but recaps the labor picture in the 1960s. In terms of our social and economic progress, some lines on the charts and graphs for the 60s moved in the wrong direction or, at best, failed to move at all.

-- Teenage unemployment was more than 12% in every year of the decade.

-- The rate for teenagers of black and other minority races was double that, running between 24% and 30%.

-- Most significantly, the gap between youth and adult unemployment rates widened. At the beginning of the decade, unemployment among the 16-19 age group was 3 times greater than for adults 25 or over. By 1969, over 5 times more teenagers were out of work than adults.

Projections show that 100 million Americans will be working or seeking work by 1980. That's 15 million more people, mostly young, who will have to be accommodated in the labor force by 1980 than we had in 1970. If 2.5 million youngsters are now leaving our schools and colleges each year without adequate preparation, how many of those 15 million are apt to be unprepared for the demands of the 1980 labor market? Compared with 1968, that market will need 50% more professional and technical workers -- but 2% fewer laborers and a whopping 33% fewer farm workers. In parenthesis, let me add that the Department of Labor sees exactly the

same number of openings for teachers in 1980 as 1962, about 40,000 fewer than the peak years of the late 1960's.

It is clear then that Career Education is an idea whose time has come. Until we bring career awareness down into the elementary grades -- until we give youngsters the desire and motivation to aim for a career that excites them -- until we prepare them to leave high school with a marketable skill or to complete work in a college or technical institute or Area Vocational-Technical School with a more advanced skill -- until we key all these activities to the labor market as it will exist when these students are ready to enter it -- until career education becomes an integral part of the educational system we will continue to short-change both our students and our society.

CAREER EDUCATION - A LONG RANGE SOLUTION

For the past year and a half career education has been a major objective of the Office of Education. No Office of Education initiative has attracted more attention nor received more support!

Career education actually relates to all educational experiences from early childhood throughout the productive life of the individual. In early childhood it provides an awareness of the world of work, and some direct, hands-on experiences to motivate and captivate the learner's interest.

At the end of high school, the burden is on the school system to give strong, positive assistance to the students in obtaining job

placement, or placement in a post-secondary institution, whichever the student chooses. Thus, a strong accountability factor is built into career education.

The development of a career education system requires the accomplishment of differing objectives at each level of the existing school system. For example, in kindergarten through the sixth grade, the objectives are to develop in each pupil self-awareness and positive attitudes about the personal and social significance of work. Students in these grades receive a meaningful overview of the world of work by being exposed to job clusters. The USOE has developed fifteen major clusters that encompass the 20,000 different job categories listed in the Dictionary of Occupational Titles.

In the seventh and eighth grades, students devote more attention to the occupational clusters of their choice, leading to an in-depth exploration at the ninth grade. Subject matter also is more meaningful and relevant because it is unified and focused around a career theme.

In grades nine and ten, the student gets in-depth exploration and training in an occupational area, and is provided a foundation for further progress. This leaves open the option to move between clusters.

In grades eleven and twelve, the student receives intensive preparation in a selected cluster, or in a specific occupation, in preparation for job-entry or further education. His studies are related more closely

to the world of work. Guidance and counseling are more concentrated. The school is obligated to assist the student in obtaining a job, entry into a post-secondary occupational education program, or entry into a four-year college program.

Career education in our technological society is designed to provide new dimensions to the education of all Americans. These are some of its most urgent objectives:

* It aims to lead all persons to respect the dignity of work well done, and to hold in high regard those who do it.
* It aims to acquaint all of our youth with a knowledge of all the different kinds of work which must be done in our complex technological society and to kindle in each the desire to master some exciting job which needs to be done, one which uses a full measure of his abilities and which will make him self-supporting and self-respecting.
* It aims to reduce the disgraceful failure and attrition rates in our high schools and colleges often caused by ill-advised or unrealistic career choices or inadequate scholastic preparation.
* It aims to insure all against the debilitating and eroding effects of enforced unemployment. Constantly available options to continue career education at any stage or age in a career will open the way if we but provide the educational opportunities.

*It aims to enable more people of all ages to spend more time in organized study whenever they need it to keep up with changes in this society's complex technological work.

The elementary occupational awareness and the prevocational and exploratory education starting in the middle and junior high schools are aimed at providing an occupational literacy and familiarity with the world of work. This helps to inform the student about the variety of challenging and interesting work in the modern world and society's need to get it done. It also builds respect for those who do it.

The concept relates to the subjects taught by all teachers so that real career-centered leaning will be used to provide an interesting emphasis and heighten student interest and motivation whether the class deals with history, language, general science, health, social science, or whatever.

As each youngster advances into junior high school, he will select various clusters or broad groupings of related occupations and begin exploring the nature of specific careers in each one. By senior high school, he will concentrate on the group of career opportunities which interests him most and will develop sufficient entry-level skills in a specific occupation to qualify for a job.

It is visualized that students will have an opportunity to enjoy actual work experience during their high school years through cooperative arrangements with employers. Yet each student's program will remain flexible enough to enable him to switch to a related occupation later with a minimum of supplementary training. In addition, each student in a career education program will keep his options open.

It is expected that the career education approach will provide better educated youth to enter either professional preparation in a four-year college or the post-high school programs which educate technicians or similarly specialized personnel.

Career education beyond the high school includes preparation required by an individual to enter employment, improvement of his knowledge or skills as they relate to his job, or preparation for new one. It also includes the cultural and recreational knowledge necessary to cope with living in the post-industrial society.

THE FLUID POWER ASSOCIATION'S POTENTIAL LEADERSHIP ROLE

Recent federal legislation has emphasized education as an important investment in people, and as a major element in the structure of our society. All phases of occupational education are being strengthened as a result.

It follows that as more highly trained personnel are needed, and are employed, the number of good occupational programs must increase. The task has just begun. Educators cannot carry this new and tremendous burden alone. The guidance and assistance of the future employers of these trainees are needed if we are to succeed. Walter F. Carey, a past President of the Chamber of Commerce of the United States said:

> "The businessman is the key element in this whole education picture. Far better than any educator, or government administrator, he is in a position to know what his company's skilled manpower requirements will be for the next five years, the next ten years. And the smartest thing he can do is to let the educators in his community in on the secret so they can

> adjust their program accordingly...Some communities that now are operating effective vocational-technical schools have as many as 43 advisory committees involving up to 500 businessmen. Here trained management men put their knowledge and experience to work on the real core of the problem: How best to prepare men and women for productive jobs that exist today and for new opportunities that will open before them as our technological revolution progresses."

A priceless opportunity is available to leaders of the fluid power industry to support both long-range career education and occupational and adult programs and to help us provide the kind of employee that is needed. High quality is a mandatory requirement for successful programs. A competent, trained teaching staff, laboratories well-equipped with apparatus representative of that used in the most up-to-date industrial establishments, a good library, adequate classrooms, and an administration sincerely dedicated to quality post-secondary occupational education are essential. It takes a minimum of five years and many thousands of dollars to establish a new program, assemble the staff, equip facilities, and graduate the first class or two. When these graduates are successfully employed and confidently advertising their success to their peers and parents, the program is well started.

A poor program is by far the most expensive of all because it costs almost as many dollars, wastes the time and effort of students and school staff; and, worst of all, disappoints potential employers, and disillusions students and their parents. We can't afford programs of less than high quality!

The most important service you can render is to become involved as advisors, consultants, and supporters of occupational programs in the State and local organizations which administer them. The writers of the Vocational Education Act of 1963, as amended in 1968, and the Education Amendments of 1972 clearly saw the necessity for knowledgeable employers to advise, counsel, and support occupational educators if we are to provide high quality trainees for their future employers; the Congress made such advisory services a mandatory part of the administrative sections of the legislation at all levels.

I hope that some of you are already serving on such advisory groups; and that others will be moved to do so if called upon. In some situations it would certainly mot be amiss to let it be known that you are available for such duty since there is a clear advantage to many of you to know from the inside exactly what goes on in this field.

Those of you who have no connection with advisory committees for vocational-technical education will need to know where to go for information on such programs and whom to contact when you have business with vocational educators.

Broadly speaking, there are three levels of contact. I represent the Federal level as Associate Commissioner for the Bureau of Adult, Vocational, and Technical Education. The Bureau is maintaining a headquarters staff in Washington and a field staff in ten regional offices throughout the country. These staffs are always available to the general public for advice and assistance in connection with problems heaving to do with occupational training. You are invited to write

directly to me or phone my office at any time, or to contact the nearest regional office of the Department of Health, Education, and Welfare, for the same service from the regional representative of my office.

At the State level, the State Directors of Vocational Education are the chief administrators. Through their Boards for Vocational Education, these men exercise the main control over funds for vocational and technical education in their States. Usually, their staffs at the State capitols include a director of technical education and one or more specialists in this field whose major duty is to work directly with the local educational institutions on such programs. They are, however, also available to provide information and assistance to the general public.

At the local level, your best contact would be with the chief administrators of the local schools, colleges or other institutions which offer, or in some cases, which should offer occupational education programs. These people work with their State officials, of course, to receive and use Federal and State funds, and to get advice and assistance on program problems which arise from time to time. Through these State officials, they also have available Regional and headquarters staff personnel of the U.S. Office of Education.

Local employers and members of the Fluid Power Association can assist education institutions by:

1. Getting acquainted with the facilities, personnel, and leadership of local education institutions and making known the need of local industry for highly skilled technicians and related personnel.

2. Assisting in surveys and defining the present and projected need for highly skilled technicians to be trained in full-time preparatory programs, and in programs for updating and upgrading the personnel already employed in the locality.
3. Serving on advisory committees on curriculum content, equipment, and the objectives of a program for educating highly skilled technicians. It is here that the curriculum guide can form a common ground of suggested information of what is practicable and required regarding course content, facilities, and teaching staff for high quality instruction of technicians for this field.
4. Assisting in obtaining, developing, and retraining qualified teachers for local technical education programs; and in encouraging teachers to maintain up-to-date technical competency, enthusiasm, and active involvement with the local employers in the field. Active participation by teachers in local technical society activities should be encouraged as one means of accomplishing these objectives.
5. Assisting in leading school personnel, parents, students, and guidance personnel to an understanding of the career opportunities offered in the field of fluid power and related fields; and encouraging public support of the local educational institutions for such a program.
6. Providing, if possible, a cooperative work experience for promising young students who are studying to be technicians, either by summer work or by cooperative educational programs.

7. Encouraging school administrators to cooperate with their State vocational education administrators, employer associations and technical society personnel so that maximum use can be made of Federal and State funds allotted for meeting technical manpower needs.

The final effectiveness of the Association's contribution may well be realized to the degree that its members, or the education committees and employers they represent, assist schools in implementing both the currently needed technician and specialist training programs and the longer range career education programs which are so urgently needed in our country today.